

## **Biomass and Lipid Enhancement by Response Surface Methodology in High Lipid Accumulating Indigenous Strain *Rhodococcus opacus* and Biodiesel Study**

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**Abstract :** Finding a sustainable alternative for today's petrochemical industry is a major challenge facing by researchers, scientists, chemical engineers, and society at the global level. Microorganisms are considered to be sustainable feedstock for 3rd generation biofuel production. In this study, we have investigated the potential of a native bacterial strain isolated from a petrol contaminated site for the production of biodiesel. The bacterium was identified to be *Rhodococcus opacus* by biochemical test and 16S rRNA. Compositional analysis of bacterial biomass has been carried out by Fourier transform infrared spectroscopy (FTIR) in order to confirm lipid profile. Lipid and biomass were optimized by combination with Box Behnken design (BBD) of response surface methodology. The factors selected for the optimization of growth condition were glucose, yeast extract, and ammonium nitrate concentration. The experimental model developed through RSM in terms of effective operational factors (BBD) was found to be suitable to describe the lipid and biomass production, which indicated higher lipid and biomass with a minimum concentration of ammonium nitrate, yeast extract, and quite higher dose of glucose supplementation. Optimum results of the experiments were found to be 2.88 gL<sup>-1</sup> biomass and lipid content 38.75% at glucose 20 gL<sup>-1</sup>, ammonium nitrate 0.5 gL<sup>-1</sup> and yeast extract 1.25 gL<sup>-1</sup>. Furthermore, GCMS study revealed that *Rhodococcus opacus* has favorable fatty acid profile for biodiesel production.

**Keywords :** biofuel, Oleaginous bacteria, *Rhodococcus opacus*, FTIR, BBD, free fatty acids

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